

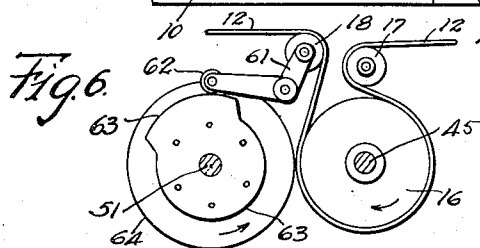
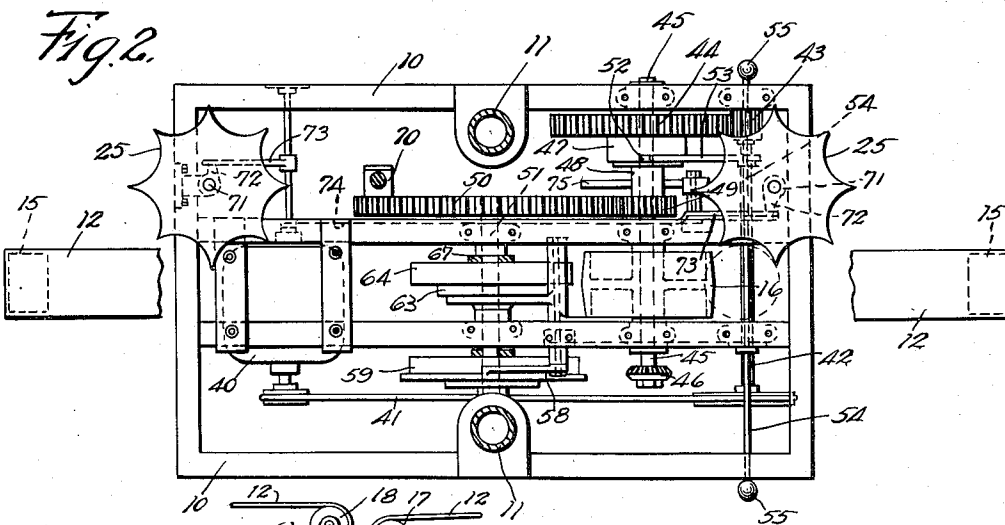
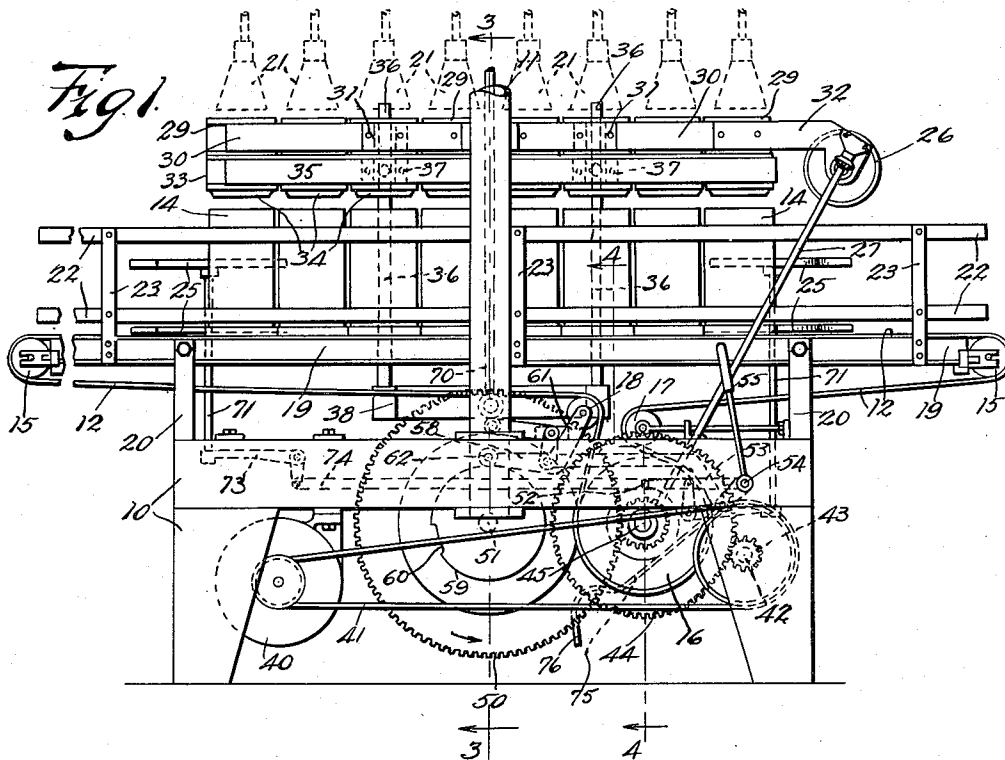
Feb. 5, 1952

J. L. FERGUSON ET AL
MACHINE WHICH FILLS GROUPS OF CONTAINERS, A
GROUP AT A TIME, WITH CONVEYER WHICH STOPS
DURING FILLING OPERATION

2,584,338

Original Filed April 12, 1943

2 SHEETS—SHEET 1



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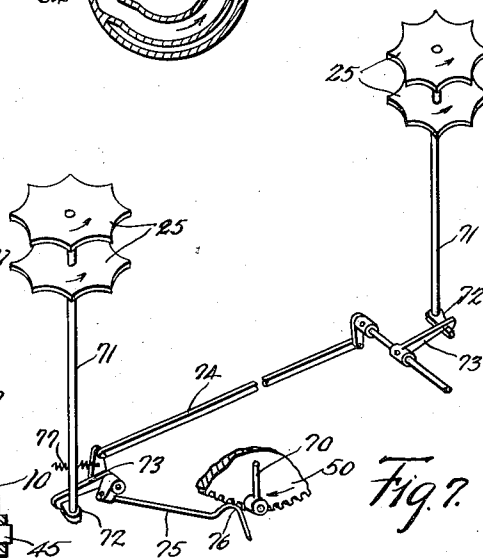
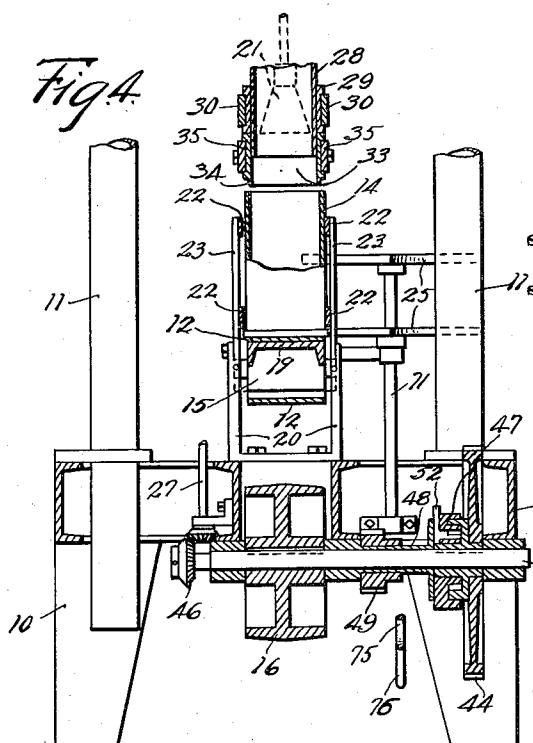
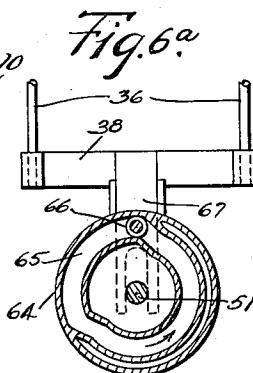
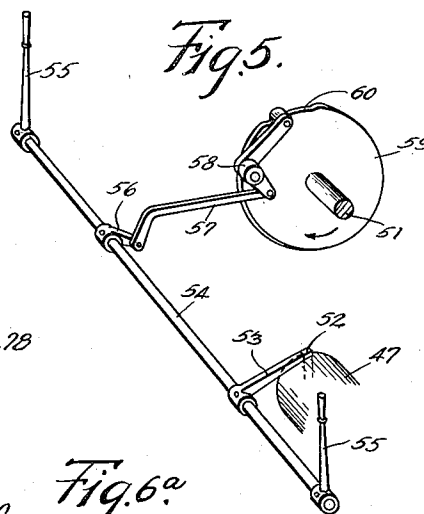
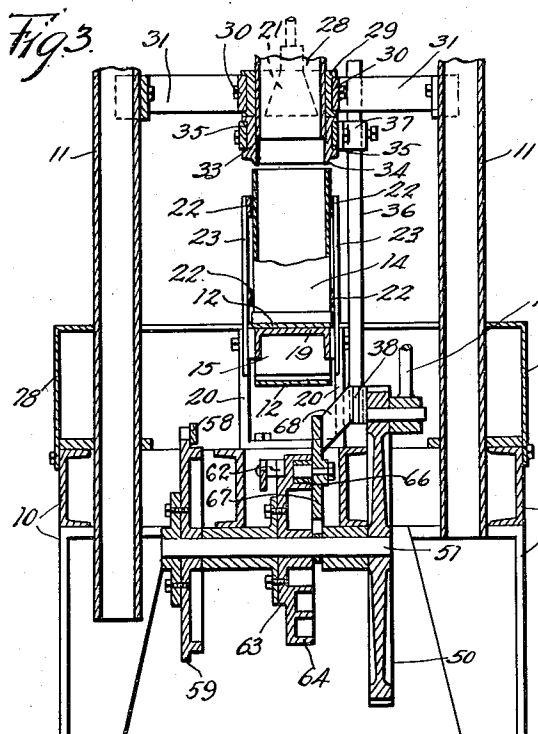
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2 SHEETS—SHEET 2



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UNITED STATES PATENT OFFICE

2,584,338

MACHINE WHICH FILLS GROUPS OF CONTAINERS, A GROUP AT A TIME, WITH CONVEYER WHICH STOPS DURING FILLING OPERATION

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Original application April 12, 1943, Serial No. 482,734. Divided and this application April 8, 1947, Serial No. 740,146

5 Claims. (Cl. 226-95)

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This invention relates to container conveyor mechanism for container-filling machines or the like whereby the empty containers, which may be in groups, are brought to the filling station of the machine and when filled are carried away from the station.

This application is a division of our application Serial No. 482,734, filed April 12, 1943, for Weighing and Filling Machine.

Such machines are used particularly for filling containers, cartons or packages with fragile flake materials, such as cereals, soap (flakes, granules, powder), etc., ground or pulverized products such as cornmeal, cornstarch, grits, barley or the like, and other comminuted or particulated materials.

Such containers most often are of paper or other light material, the product with which they are filled may require packing or compression within the containers by packing plungers from above at the filling station, and the conditions may make it desirable that the containers be handled and filled in single row groups of a plurality of containers, as many as eight being so accommodated in the mechanism disclosed in the present application.

Objects of the present invention are, severally, to provide a suitable conveyor mechanism for carrying the empty containers in upright position to the filling station of the machine, stopping and solidly supporting the same during the filling operation, and then carrying the filled containers out of the filling station and machine, all without harm or damage to the containers, without tipping them over or spilling their contents, and in suitable timed relation with the other mechanism of the filling machine; to provide a suitable endless-belt conveyor for so carrying the containers and gradually starting and stopping the same, so that the packages or containers are not mutilated thereby or tipped over thereon; to provide the belt with a friction drive pulley to gradually start and stop the same in the manner indicated; to provide the belt with a solid support or bed at the filling station to hold the containers at proper upright position during filling and to receive the packing thrust of the packing plungers, if same be used, or other weight imposed on the packages; to provide such bed throughout the container-carrying flight of the belt to tend to maintain the containers in upright position laterally and suitably to support the belt on the bed of the filling machine; to provide means, preferably in the form of star wheels and drop spouts accurately

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and definitely to ensure the positioning of the containers in the filling position and to assist in timing them in their movements; and to provide a power-driven roller for the tops of the containers as they issue from the filling position.

Other objects and advantages will appear from the description and claims to follow, in connection with the accompanying drawings showing, by way of illustration but not of limitation, a conveyor and associated parts embodying the invention, and so much of the machine of the said parent application as is thought necessary or desirable to show the application of the invention thereto; and in which drawings:

Fig. 1 is a side elevation of the conveyor mechanism and lower part of the machine to which it is applied;

Fig. 2 is a plan view of the same, the upper part of the structure of Fig. 1 being omitted and the conveyor belt being broken away to show the mechanism beneath;

Fig. 3 is a central vertical cross section of the machine on the line 3-3 of Fig. 1;

Fig. 4 is a similar cross-sectional view taken on plane 4-4 of Fig. 1 through the main drive shaft of the machine;

Fig. 5 is a perspective schematic or diagrammatic view of the main clutch control of the machine;

Fig. 6 is a diagrammatic view of the conveyor belt starting and stopping elements, including the cam;

Fig. 6A is a similar view of the drop spout operating elements which involve the other face of the conveyor belt cam; and

Fig. 7 is a view similar to Fig. 5 but of the star wheel control elements.

The filling machine shown in the drawings has a solid supporting framework consisting of a rectangular bed table frame 10 with two hollow cylindrical posts 11, 11 extending upwardly from midway of the two side members of the bed. The machinery and other parts are all supported directly or indirectly by this framework, the electric driving motor, operating cams, gearing, etc., being located in the bed, the belt conveyor 12 for the containers being supported over the bed frame longitudinally thereof and between the posts 11, and the weighing and filling mechanism (not shown) being at and around the tops of the posts.

The containers 14, which in this instance are round in cross section, are brought into the machine and taken out again by the conveyor belt

12. It is arranged gradually to come to a stop at the filling position and to remain standing while the containers are being filled, the containers resting thereon during filling, and gradually to start up again when the filling and packing have been completed, to carry the filled containers out of the machine, all without tipping the containers or spilling the contents thereof or damaging the containers. As seen in Fig. 1, the conveyor belt 12 passes over idler pulleys 15 at the very ends of the machine, the containers 14 resting or standing on end on and being carried side by side by the upper horizontal flight of the belt.

The lower flight of the conveyor belt is carried nearly around the driving belt wheel or pulley 16, which is continuously power-operated, and over a couple of idler pulleys 17 and 18 (Fig. 1), the latter being cam-operated to tighten or loosen the belt around the drive pulley and thereby permit the belt gradually to start and stop, whereby to prevent mishandling of the containers in the starting and stopping and during the filling and packing periods. The horizontal or upper flight of the conveyor belt is supported on a bed formed by the flat web of an inverted channel beam 19, which is raised above the table 10 of the machine by U-brackets 20 bolted to the end members of the table 10, the upper ends of the legs of the brackets 20 being bolted through suitable spacing blocks to the edge flanges of the belt bed channel 19. This gives room for the return flight of the belt above the bottom table 10 and for any other parts therebetween. The end pulleys or rollers 15 are journaled in suitable adjustable brackets secured to the ends of this belt channel 19.

Guide rails 22 for the sides of the containers may be suitably supported near the tops and bottoms of the containers 14 by vertical members 23 riveted or otherwise suitably secured to the rails and to the edge flanges of the belt bed channel 19. The containers 14 readily and freely pass along this runway between the side rails 22, the runway, conveyor belt, etc., being shown broken off at the left in Fig. 1, that is, at the container intake end of the machine, which may be as long as desired. In the particular machine depicted in the drawings, it preferably is long enough at least to accommodate eight empty containers to the left of the filling position for the containers.

The containers are thus moved into and out of the filling position of the machine, the same being carried all the time on the belt conveyor. The belt conveyor is started and stopped properly to bring eight empty containers into filling position and at the same time to carry out from the machine the eight filled and packed containers. The conveyor belt thus stops for the filling and packing period, during which time the containers remain at rest upon the belt. This is all carried out in timed relation to the filling operations of the apparatus above by the mechanism in the bed of the machine, but since the containers depend merely upon their frictional contact with the belt for their propulsion through the machine, and yet must be accurately positioned for filling and packing through the drop spouts, etc., above, suitable control star wheels 25 are provided at the entrance and at the exit of the filling position. There are preferably two of these star wheels at each end, one above the other, on a single shaft and vertically positioned to engage the sides of the containers

near the bottom and a little above the center. They, of course, are positioned at the side of the runway for the containers, and their peripheral recesses accommodate the curved sides of the containers, as seen in plan in Fig. 2.

There are eight of these container recesses in the periphery of each star wheel in this particular machine, so that one revolution of the star wheel will pass eight containers in the runway and on the conveyor belt. Furthermore, the mechanism is such that these star wheels are stopped at each revolution when the containers are in proper position for filling, but they are freed when the belt starts up. In this way and with the drop spouts the containers are accurately positioned in the filling station.

A power-driven roller 26 (Fig. 1) engages the tops of the containers as they emerge from the filling and packing position to insure that the containers emerge properly from the machine even though some sort of stopping or interruption may occur in the production line after they leave this machine. This roller is driven continuously by the inclined shaft 27 from the mechanism in the base of the machine, as hereinafter explained.

The containers 14 when in filling position on the conveyor belt are suitably and simultaneously filled from the material delivery spouts 28 above, into which the material to be packaged is emptied from the corresponding weighing buckets (not shown) of the machine. There are in this machine eight of these delivery spouts 28 rigidly held in line over the filling position and containers when in filling position, by cast rings 29 which are all secured together and in place by a bar 30 on each side of the group of spouts 28. Each bar 30 is in turn secured to the vertical post 11 of the machine on the corresponding side of the spouts by a pair of diagonal braces 31 reaching from the post 11 to the bars 30 near their ends. The spouts 28 are thus held rigidly to their positions.

The power-driven roller 26, above referred to, is supported by brackets 32 secured one to each bar 30, as indicated.

On the lower ends of these fixed spouts 28 are drop spouts 33 which are cast-metal sleeves slidable thereon for a short vertical distance to extend the delivery spouts actually into the upper ends of the containers. The lower edge of the drop spout is in the form of a tapered ring 34, tapered on the outside, which is adapted to enter the open end of the container slightly and enough to definitely locate the containers in the filling position on the conveyor and hold them from lateral displacement and in proper position for filling. After the filling is completed and the packing plungers 21 (shown in dotted lines), if used, have entered through the fixed and drop spouts suitably to pack the material in the cans and have withdrawn, the drop spouts are lifted sufficiently to clear the containers and permit them to be moved out of the filling position and empty containers brought in.

These drop spouts 33 are all secured together, like the supporting sleeves 29, by side bars 35 in side grooves in the drop spouts, all being bolted together as a unit and all being raised and lowered together by a couple of vertical rods 36 secured at their upper ends, as shown, to the adjacent side bar at 37. The upper ends of said rods 36 may reciprocate through suitable guide lugs (not shown) secured to the bars 30 just above.

The lower ends of said rods 36 are secured to

the ends of the horizontal member 38 of a cam yoke which together with a suitable cam on the cam shaft and other parts in the base of the machine serve to move the drop spouts up and down sufficiently for their purpose and in proper timed relation, as will be explained.

The packing plungers 21 (indicated in dotted lines) are secured together in the upper part of the machine (not shown) and are movable up and down as a group through the fixed spouts and drop spouts and upon the material in the containers when the drop spouts are down and engaging the containers. This timing and sequence are likewise taken care of by the cams, etc., in the base of the machine, as will be explained so far as may be necessary or desired for the present application.

Referring to Figs. 1 and 2, the driving electric motor 40 is connected by a long belt 41 with a pulley on shaft 42 at the other end of the table base. This shaft, through the small gear pinion 43 on its opposite end, drives the larger gear 44 mounted on the driving shaft 45 which parallels shaft 42. When the motor 40 is running, therefore, shaft 42, gear 44 and shaft 45 are running also. The wide belt pulley 16 on this shaft is the driving pulley for the belt conveyor 12 to carry the containers through the machine, and likewise is continuously running when the motor is turned on.

The small beveled gear 46 at the other end of this shaft 45 drives the inclined shaft 27 which operates the exit roller 26 (Fig. 1) for the containers.

A clutch 47 connects the shaft 45 with a sleeve 48 on the shaft, which carries at its opposite end a gear pinion 49 meshing with a large gear and crank disc 50 on the main cam shaft 51 of the machine. The cam shaft 51, therefore, rotates only when the clutch 47 connects the sleeve 48 to the drive shaft 45 in rotatable relation.

The clutch 47, generally known as a dog clutch, is of that type having an inside dog or pin with a projecting lug 52, which, when engaged by the pawl or arm 53 from the outside, frees the clutch and sleeve from the shaft 45, but when the arm or pawl 53 is lifted out and away from the lug 52, the clutch pin rotates and connects the clutch and sleeve for rotation of the parts with the shaft 45.

This pawl or arm 53 is mounted on small shaft 54, which has a hand lever 55 on each end and at each side of the bed 10 of the machine. By these hand levers, therefore, or either of them, the cam shaft 51 and the cams thereon can be started and stopped as desired. The construction and arrangement of these starting and stopping levers 55 and their associated parts are such that they will remain in either extreme position until manually moved therefrom.

The clutch 47, in the construction here shown, makes about six revolutions to one of the wheel 50 and of the cam shaft 51. The latter should be stopped only when, for example, the packing plungers are in the upper part of their stroke and out of the way of the other parts. But the clutch 47 could be stopped at any of its six revolutions instead of at the particular one corresponding to the upper position of the plungers, except for the feature now to be described. The hand lever shaft 54 (Fig. 5) has an arm 56 connected by bent link 57 with the lower arm of angle lever 58 journaled in a bearing on the top flange of one of the two channel bars extending longitudinally of the bed of the table. The other

arm of this angle lever 58 has a cam roller adapted under certain conditions to bear on the outer rim or periphery of cam disc 59 on the cam shaft 51. This disc has a depression 60 in its peripheral cam track into which the roller drops and permits arm 53 on hand lever shaft 54 to drop into position to strike the clutch lug 52 when it comes around to it in its next rotation and thereby to throw out the clutch 47.

This occurs when the packing plungers 21 are in the upper part of their stroke, but at other times, if the hand lever has been moved to stop the machine, the cam roller of lever 58 rides on the other and raised part of the periphery of the cam disc 59 and prevents the arm or dog 53 on shaft 54 from dropping into the path of the clutch lug. Also, when the hand lever is pulled entirely back to free the dog 52 from the clutch, as for instance at the beginning of the run of the machine for any extended time, the cam roller on lever 58 is lifted entirely free from the periphery of cam 59 at all points, and the machine, therefore, continues to operate until the hand lever has been moved and the disc reaches the proper position for stopping.

Accordingly, after the machine has been started by pulling the hand lever 55 in an outward direction, the cam shaft 51 and the cams thereon continue to rotate, as well as shafts 42 and 45 and conveyor belt drive pulley 16.

The conveyor belt tightening and loosening pulley 18 is operated as follows. This pulley 18 (Fig. 6) is carried on an arm of a bell crank lever 61, suitably fulcrumed on the frame or bed of the machine, the other arm of which carries a cam roller 62 engaging the cam track 63 on one face or side of cam disc 64 which is mounted on shaft 51 midway of the shaft and machine. Thus, when the cam roller engages the high point of track 63 on cam 64, the pivoted idler roller 18 is swung over to tighten the conveyor belt around the conveyor drive pulley 16 and thus to start up the belt gradually, and when the cam roller again passes to the lower part of the cam track, the belt gradually comes to a stop by the loosening of the idler pulley. This, of course, occurs but once in the revolution of the cam shaft and causes the belt to shift the empty containers into the filling position and the filled containers out of it and then to remain quiescent with the containers resting thereon during the filling and packing. The conveyor belt also passes over another idler pulley 17, which may be adjusted to vary the belt tension. These idler pulleys cause the conveyor belt to pass nearly or substantially around the entire circumference of the drive pulley, thus giving it increased surface contact, greater tractive force and a more positive driving action on the belt than the ordinary belt and pulley action or drive.

The other face of this cam 64, which is shown in Fig. 6A, has a cam track 65 in which is located the cam roller 66. This roller is mounted on a vertically movable fork member 67 attached to the horizontal bar 38 carrying the rods 36, the upper ends of which are secured, as before explained, to the drop spouts 33. The upper end of this fork member 67 is laterally offset, as at 68 (Fig. 3).

As the cam 64 revolves, the high part of the cam track 65 lifts up the roller 66 together with the drop spouts, and the low part of the track drops the spouts into the containers as above explained.

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On the same cam shaft 51 the large gear wheel 50 is secured and drives it. The wheel itself is driven by the gear pinion 49. This gear wheel is also the crank disc for the operation of pitman rod 70 (Fig. 3), the lower end only of which is shown in full lines, which reciprocates the packing plungers 21 of the packing and filling mechanisms above. The lower end of this pitman rod 70 acts in its rotation with the wheel 51 as a cam for operating the star wheel stops, as will now be explained.

The star wheels 25 (see Fig. 7 also) are mounted at the upper ends of two vertical shafts 71 suitably journaled in brackets secured to the framework of the machine, as indicated. A lateral arm 72 at the lower end of each shaft 71 is adapted to be engaged by a pivoted hook 73 to stop the rotation of the shafts and star wheels. This occurs when the containers are all in their filling position. These hooks 73 are simultaneously raised to free the star wheels by link bar 74 connecting them. Link bar 74 is connected at each end with an arm on the pivot of the hook or is connected directly therewith, so that movement of the link in one direction will raise the hooks to release the star wheels simultaneously and a movement in the other direction closes them or restores them to the path of the arms 72 on the star wheel shafts so that both star wheels are stopped simultaneously. These hooks are automatically raised in timed relation with the other parts. A rod or arm 75 is rotatively secured to the hook 73 at the adjacent or control handle end of the machine and has as its other end bent or upwardly bowed as at 76 and standing in the path of movement of the crank pin or lower end of pitman rod 70 on gear 50, which is journaled on said crank pin. When, therefore, in the rotation of this wheel 50, the end of pitman rod 70 strikes said upwardly bowed portion 76 of lever arm 75, the latter is depressed and the hooks 73 are raised and the star wheels 25 are free for rotation. The hooks are then lowered again under the influence of tension spring 77 to engage the arms 72 on the star wheel shafts to stop the same at the end of a complete revolution.

The bed frame of the machine may include two longitudinal channel iron members secured therein, and the various shafts and other parts mentioned are suitably secured thereto and to the frame as indicated in the drawings. A removable sheet-metal cover 78, in two like parts, having top, ends and a side each, covers and encloses the mechanism on each side of the bed channel of the conveyor, to protect the mechanism in the base from dust and dirt from above and contact therewith.

When the containers are filled, the conveyor belt gradually starts up by the effect of the raised portion of the cam track 63 on cam disc 64 in pushing the idler roller 18 into the belt and therefore tightening it around the continuously rotating belt drive pulley 16; and the star wheels 25 are freed for rotation by the striking of the end of pitman rod 70 of crank disc or gear wheel 50 against the end of the lever arm 75 and the consequent lifting of the hooks 73 at the lower end of each star wheel shaft 71.

Thus the eight containers with the filled and packed product in them are moved out of the machine, this being insured by the continuously driven roller 26 above, and eight empty containers are brought in at the same time for the next group to be filled. The operation of the

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machine is under control of the operator or attendant at all times through the handles or levers 55. Further description of the operation is deemed unnecessary.

Of course, the supplying of the empty containers to and the removal from the machine of the filled containers, whether done by hand or by automatic mechanism, is not a part of this invention and therefore not shown or described. Usually, however, the machine is placed in a production line where the containers are fed automatically to and from the machine by suitable conveyors. The adjustments necessary to adapt the machine to different containers and products are obvious and may be carried out by those skilled in the art.

It will be apparent that the invention may be varied in its physical embodiment without departing from the spirit of the invention, and it is desired, therefore, that the invention be limited only by the scope of the appended claims.

Having thus described the invention, what is claimed and desired to be secured by Letters Patent is:

1. A machine for filling containers with comminuted material comprising a supporting framework, a horizontal passageway formed in said framework for the passage of containers there-through, an endless flat surfaced conveyor belt in the machine with its upper flight forming the floor of said passageway and carrying the containers uprightly and in serial contact thereon through said passageway, container-filling mechanism in the machine over said passageway intermediate the ends thereof having provision for simultaneously filling a group of said containers, a continuously operated friction drive pulley in the base of the machine, the lower flight of said conveyor belt passing in a loop thereof substantially around said pulley to drive the belt, a belt-tightening and loosening idler pulley for the belt at said loop, and control mechanism for said idler pulley operating in timed relation with the filling mechanism to tighten or loosen the belt on said drive pulley and gradually to start and stop the belt in the filling position, the containers remaining stationary on the stopped belt while the group is being filled at the filling position.

2. A machine for filling containers with comminuted material comprising a supporting framework, a horizontal passageway formed in said framework for the passage of containers there-through, an endless flat surfaced conveyor belt in the machine with its upper flight forming the floor of said passageway and carrying the containers uprightly and in serial contact thereon through said passageway, container-filling mechanism in the machine over said passageway intermediate the ends thereof having provision for simultaneously filling a group of said containers, a continuously operated friction drive pulley in the base of the machine, the lower flight of said conveyor belt passing in a loop thereof substantially around said pulley to drive the belt, a belt-tightening and loosening idler pulley for the belt at said loop, and control mechanism for said idler pulley operating in timed relation with the filling mechanism to tighten or loosen the belt on said drive pulley and gradually to start and stop the belt in the filling position, the containers remaining stationary on the stopped belt while the group is being filled at the filling position, said container filling mechanism including drop sprouts engaging the top of the containers and holding them in filling position during filling, and a flat

bed underlying and supporting the said upper flight of the conveyor belt through the machine and filling position.

3. A machine for filling containers with com-
minuted material comprising a supporting frame-
work, a horizontal passageway formed in said
framework for the passage of containers there-
through, an endless flat surfaced conveyor belt
in the machine with its upper flight forming the
floor of said passageway and carrying the con-
tainers uprightly and in serial contact thereon
through said passageway, container-filling
mechanism in the machine over said passageway
intermediate the ends thereof having provision
for simultaneously filling a group of said con-
tainers, a continuously operated friction drive
pulley in the base of the machine, the lower
flight of said conveyor belt passing in a loop
thereof substantially around said pulley to drive
the belt, a belt-tightening and loosening idler
pulley for the belt at said loop, and control
mechanism for said idler pulley operating in
timed relation with the filling mechanism to
tighten or loosen the belt on said drive pulley
and gradually to start and stop the belt in the
filling position, the containers remaining sta-
tionary on the stopped belt while the group is
being filled at the filling position, said container
filling mechanism, including drop spouts oper-
ated to engage and hold the containers in filling
position during filling and packing plungers for
pressing the material down in the containers
when standing on the belt in filling position, and
a flat bed underlying and supporting the said up-
per flight of the belt through the machine and
filling position.

4. A machine for filling containers with com-
minuted material comprising a supporting frame-
work, a horizontal passageway formed in said
framework for the passage of containers there-
through, an endless flat surfaced conveyor belt
in the machine with its upper flight forming the
floor of said passageway and carrying the con-
tainers uprightly and in serial contact thereon
through said passageway, contained-filled mech-
anism in the machine over said passageway inter-
mediate the ends thereof having provision for
simultaneously filling a group of said containers,
a continuously operated friction drive pulley in
the base of the machine, the lower flight of said
conveyor belt passing in a loop thereof substan-
tially around said pulley to drive the belt, a belt-
tightening and loosening idler pulley for the belt
at said loop, and control mechanism for said
idler pulley operating in timed relation with the
filling mechanism to tighten or loosen the belt
on said drive pulley and gradually to start and
stop the belt in the filling position, the con-
tainers remaining stationary on the stopped belt
while the group is being filled at the filling po-
sition, star wheels at the side of the said passage-
way at the entrance and exit of the container
filling position therein, said star wheels being en-
gaged and rotated by the containers as they are
carried along on the belt, a stop mechanism for
the star wheels operated independently of the belt
but in substantial timed relation therewith posi-
tively to enforce stopping of the containers in
filling position, said stop mechanism having pro-
vision for releasing the star wheels for movement

of the containers by the belt at the completion of
the filling operation.

5. A machine for filling containers with com-
minuted material comprising a supporting frame-
work, a horizontal passageway formed in said
framework for the passage of containers there-
through, an endless flat surfaced conveyor belt in
the machine with its upper flight forming the
floor of said passageway and carrying the contain-
ers uprightly and in serial contact thereon
through said passageway, container-filling mech-
anism in the machine over said passageway inter-
mediate the ends thereof having provision for
simultaneously filling a group of said containers,
a continuously operated friction drive pulley in
the base of the machine, the lower flight of said
conveyor belt passing in a loop thereof substan-
tially around said pulley to drive the belt, a belt-
tightening and loosening idler pulley for the belt
at said loop, and control mechanism for said idler
pulley operating in timed relation with the filling
mechanism to tighten or loosen the belt on said
drive pulley and gradually to start and stop the
belt in the filling position, the containers remain-
ing stationary on the stopped belt while the group
is being filled at the filling position, a pair of star
wheels at the entrance and at the exit of the con-
tainer filling position of said passageway engaged
and rotated by the containers on the belt as they
pass along, one wheel of each pair engaging the
containers near the bottoms thereof and the other
spaced above and engaging the bodies of the con-
tainers, a stop mechanism for said star wheels
operated independently of the movement of the
belt but in substantial timed relation therewith
to ensure proper positioning of the containers in
filling position, said stop mechanism having pro-
vision for releasing the star wheels for rotation
upon completion of the filling operation.

JOHN L. FERGUSON.
RICHARD C. TALBOT.

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